

AMENDMENTS TO THE CLAIMS

Please amend the claims as shown. After entry of this amendment, claim 33 is amended and claims 3, 6, 13, 20, and 34-44 are cancelled, all without prejudice, as indicated on the following listing of all the claims in the present application after this Amendment:

1. (previously presented) A solid state light emitting diode device comprising:
an active layer emitting incoherent light in response to current injected into the layer;
a first structure comprising at least one waveguide layer adjacent to the active layer and two cladding layers wherein said active layer and said at least one waveguide layer are located between the two cladding layers, wherein an index of refraction of said at least one waveguide layer is higher than that of the cladding layers, said structure trapping the incoherent light generated by the active layer; and

a second structure comprising a photonic crystal structure adjacent to the first structure extracting the incoherent light that is trapped by the first structure and outputting incoherent light.

2. (original) The device of claim 1, wherein the first structure contains substantially a single optical mode or a few lower-order optical modes, and traps the light generated in the said optical mode(s).

3. (cancelled)

4. (previously presented) The device of claim 1, wherein the at least one waveguide layer has a thickness between about 30 nm to 250 nm.

5. (previously presented) The device of claim 1, further comprising a transparent and conductive layer over the first structure.

6. (cancelled)

7. (previously presented) The device of claim 1, further comprising an Indium Tin Oxide layer over the at least one cladding layer.

8. (previously presented) The device of claim 7, said Indium Tin Oxide layer being electrically conductive, substantially transparent and has an index of refraction of about 1.8, said Indium Tin Oxide layer serving as an interface of the device with air or other media.

9. (original) The device of claim 7, wherein the Indium Tin Oxide layer has a thickness in a range of about 30 to 300 nm.

10. (previously presented) The device of claim 7, wherein the Indium Tin Oxide layer has a thickness of about 89 nm for 640 nm optical emission by the device, or about 65 nm for 470 nm optical emission by the device.

11. (original) The device of claim 7, wherein the Indium Tin Oxide layer has a thickness substantially equal to $\lambda / (4 n_{ito})$, where λ is wavelength of light generated by the active layer, and n_{ito} is the index of refraction of the Indium Tin Oxide layer.

12. (original) The device of claim 7, further comprising a metal layer between the Indium Tin Oxide layer and the active layer.

13. (cancelled)

14. (previously presented) The device of claim 1, wherein the photonic crystal structure comprises at least one array of holes in the device.

15. (previously presented) The device of claim 14, said second structure comprising at least one layer, wherein the photonic crystal structure comprises at least one array of holes in said at least one layer.

16. (original) The device of claim 14, said at least one array of holes forming a two dimensional array.

17. (original) The device of claim 16, further comprising at least one electrode layer through which current is injected into the active layer.

18. (original) The device of claim 17, said at least one electrode layer having a grid-shaped pattern, or a pattern with hexagonal openings therein.

19. (original) The device of claim 18, said second structure comprising a plurality of arrays of holes, each array located so that it is enclosed by a grid cell or exposed through a hexagonal opening in said at least one patterned electrode layer, wherein each array extracts light from the first structure and causes the extracted light to escape through a corresponding hexagonal opening of the electrode layer, or an area bounded by adjacent strips of a grid-shaped electrode layer.

20. (cancelled)

21. (previously presented) The device of claim 18, said array of holes of the photonic crystal structure forming a triangular pattern, said photonic crystal structure comprising a plurality of photonic crystal cells, each photonic crystal cell having a hexagonal shape within each of the hexagonal openings in the electrode.

22. (original) The device of claim 18, said electrode layer comprising elongated strips forming a network, wherein a width of the strips is in a range of about 1 to 100 μm .

23. (previously presented) The device of claim 17, said device comprising a plurality of semiconductor chips, said photonic crystal structure comprising a plurality of photonic crystal cells, said at least one electrode layer comprising a network on each chip enclosing at least one of the photonic crystal cells.

24. (original) The device of claim 23, said network comprising a plurality of grid cells, each grid cell enclosing a photonic crystal cell.

25. (original) The device of claim 24, said grid cells being square or rectangular in shape.

26. (original) The device of claim 24, each photonic crystal cell within a grid cell having a dimension in a range of about 1 to 100 μm .

27. (original) The device of claim 17, wherein there is no hole abutting and underneath the at least one electrode layer.

28. (original) The device of claim 16, said holes forming a triangular, square or rectangular array.

29. (original) The device of claim 14, wherein a lattice constant of said at least one array of holes is in a range of about 80 to 500 nm, and the holes have diameters in the range of about 50nm to 300 nm.

30. (previously presented) The device of claim 1, said photonic crystal structure comprising a plurality of photonic crystal cells, each photonic crystal cell having a dimension in a range of about 1 to 100 μm .

31. (original) The device of claim 1, further comprising a substrate layer.

32. (previously presented) The device of claim 31, wherein the substrate layer has a band gap that is wider than that of the active layer, so that light emitted by the active layer is not absorbed significantly by the substrate layer, and so that light emitted by the active layer is emitted from both sides of the device.

33. (currently amended) A solid state light emitting device comprising:

an active layer emitting light in response to current injected into the layer;

a first structure adjacent to the active layer, said structure trapping the light generated by the active layer, said first structure comprising at least one waveguide layer adjacent to the active layer, said at least one waveguide layer and the active layer trapping the light generated by the active layer;

a substrate layer; and

a second structure adjacent to the first structure extracting the light that is trapped by the first structure, wherein the substrate layer has an electronic band gap that is wider than that of the active layer, so that light emitted by the active layer is not absorbed significantly by the substrate layer, and so that light emitted by the active layer is emitted from both sides of the device, wherein the second structure comprises holes that extend through the first structure and the active layer to a region between the substrate and active layers, wherein the light extracted by the second structure and outputted from the device is incoherent.

34. – 44. (cancelled)